

Fig.5.

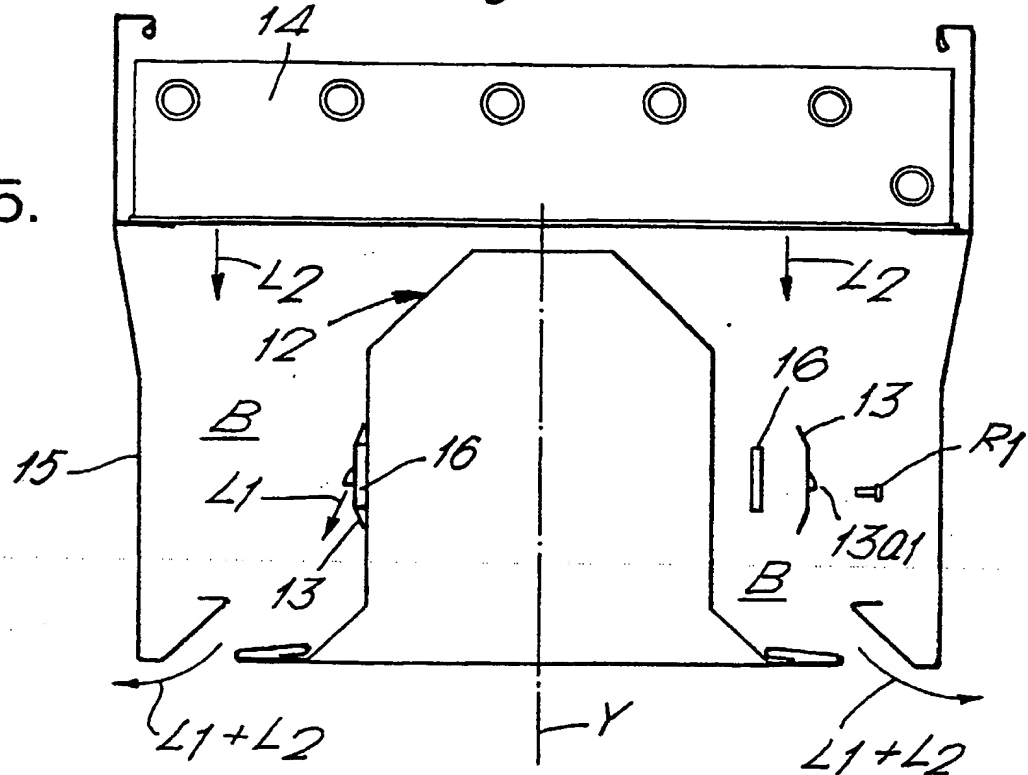


Fig.7.

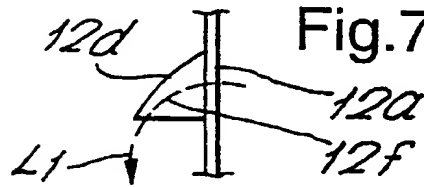
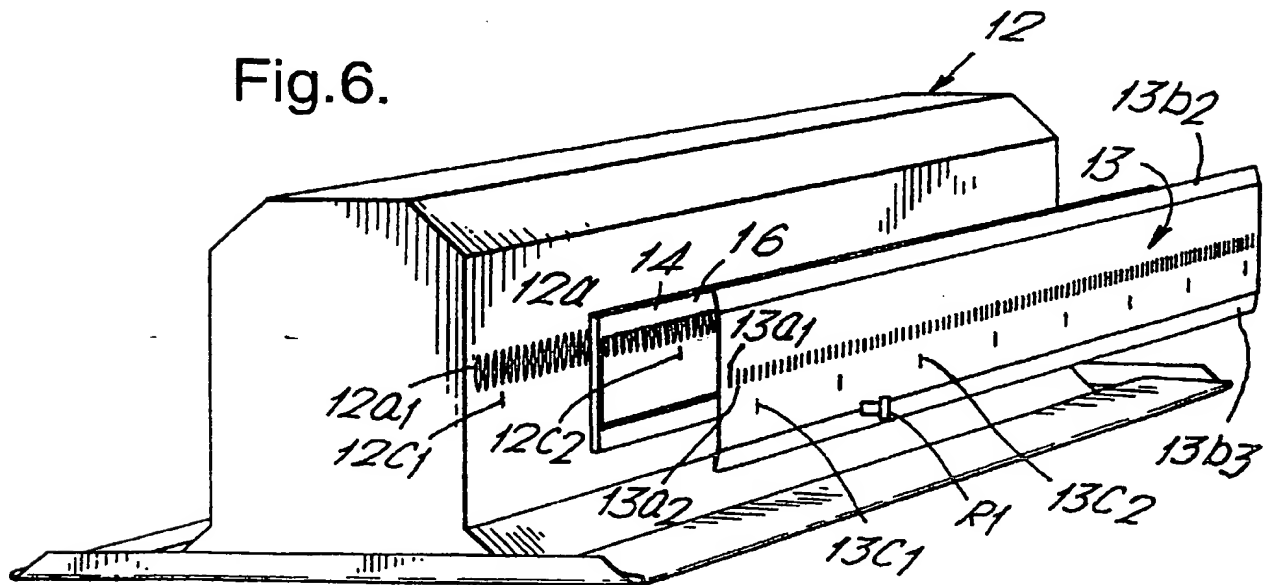


Fig.6.



AIR SUPPLY MEANS

The present invention relates to an air supply means.

-5 In the state of art, incoming air means are known with which room air is circulated through a heat exchanger and through which fresh air is also circulated into the room. With the heat exchanger means, room air circulated can either be cooled or heated. When using supply air means in various spaces,
10 said means are frequently positioned in a standard location in the ceiling of the room. However, when the use of a room changes, e.g. when a room, initially intended for one person, is converted into a meeting place for several people, the supply air means must be
15 adapted so that more fresh air can be supplied to the room through the air supply means. Therefore, the demand for a more flexible air supply means has grown recently and also the means are required to be more modifiable.

20 In the present application, a novel design is disclosed which seeks to increase the adaptability of the air supply means. According to embodiments of the present invention, there is provided a detachable nozzle plate construction whereby the nozzle plate can
25 be replaced according to the use. Nozzle plates provided with e.g. four different nozzle sizes may be available, which can be optionally installed in place when the ultimate use of the device is known.

30 An embodiment of the invention can be used in a so-called closed beam structure in which air is circulated through a heat exchanger by circulation provided by induction of fresh air discharged from the supply air duct and in which construction the supply air means is closed on the sides and on the top. An
35 embodiment of the present invention is also appropriate for use in connection with so-called open beam

structures in which the circulation air is directed into a side chamber of the air supply means through a heat exchanger, said side chamber being open on the top and on the bottom and in which fresh air is supplied through a fresh air supply duct on a side of the side chamber. The combined air flow in each embodiment is advantageously directed sideways.

According to one aspect of the present invention, there is provided a supply air means, comprising a supply air duct, through which fresh air is conducted and which supply air means comprises a heat exchanger, wherethrough the circulated air is conducted from the room, so that the fresh air and the supply air are combined in the means and the combined air flow is conducted into the room space, characterized in that the means comprises a detachable nozzle plate in connection with the supply air duct, said plate comprising nozzles through which fresh air is conducted.

Preferably, the nozzle plate is an elongated plate-like part wherein the nozzles are made by die-cutting or embossing and that the nozzle plate comprises holes, wherethrough the fixing members are taken to the supply air duct detachably for fixing the nozzle plate onto the fixing surface thereof and that the fixing surface comprises through holes located so that the nozzles of the nozzle plate will be located at the through holes of the fresh air duct.

Desirably, the nozzle plate is attached to be detachable to the supply air duct so that sealing circulates along the edge of the nozzle plate and will be located between the nozzle plate and the fixing surface of the supply air duct.

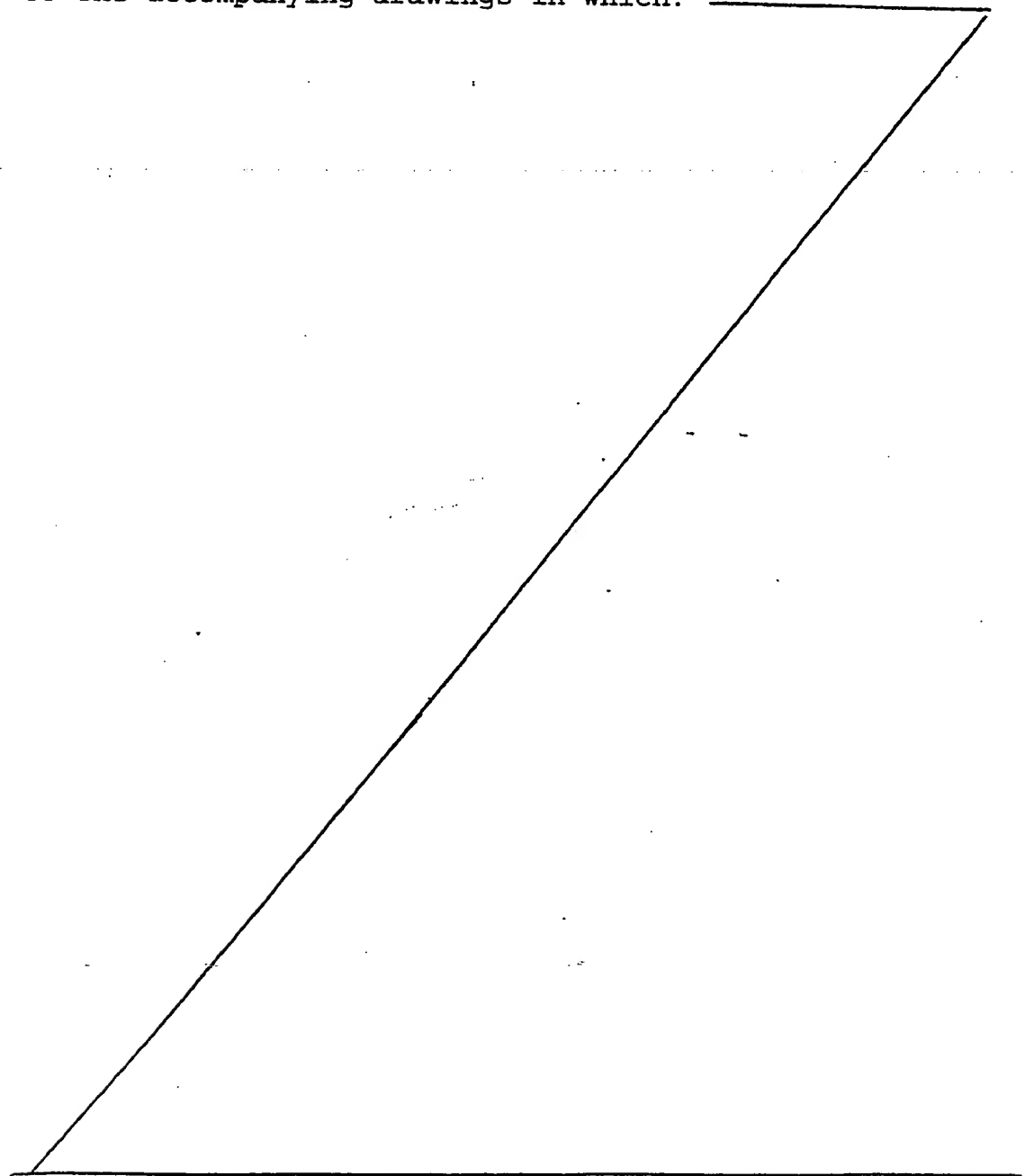
Preferably, the body plate is provided with nozzles and that it is moreover provided with an edge bent at an oblique angle relative to the body plate,

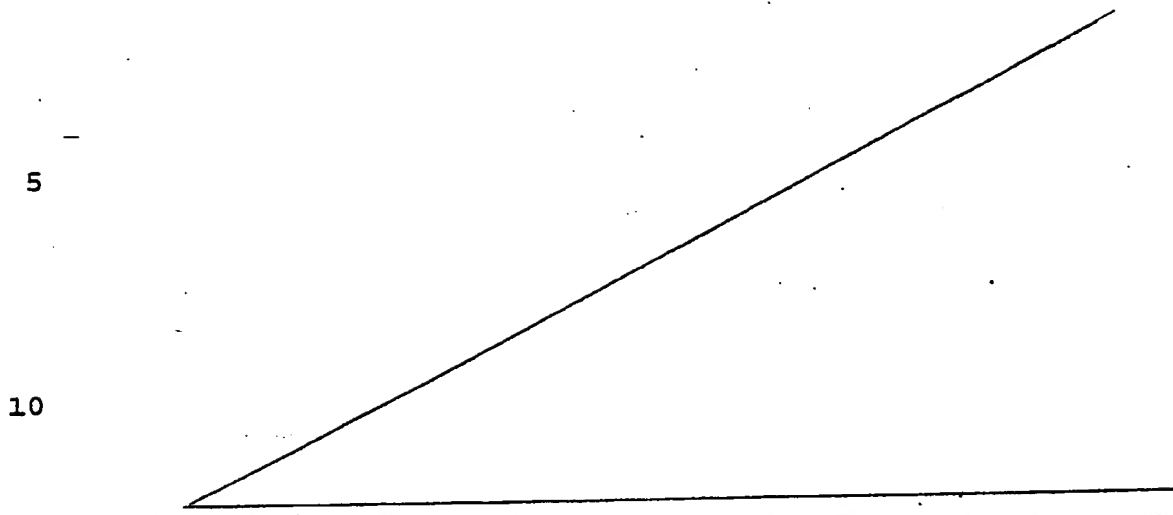
whereby with the aid of at least one edge a spring force is provided so that the edges of the nozzle plate are pressed, utilizing the spring force, tightly against the stop faces to form a connection between the nozzle plate and the supply air duct.

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For a better understanding of the present invention, and to show how the same may be carried into effect, reference will now be made, by way of example, to the accompanying drawings in which:

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15 Figure 1 presents a first advantageous embodiment of the invention. The supply air means according to this embodiment of the invention is shown as a cross-sectional image.;

20 Figure 2 presents an embodiment of the invention, in which the detachable nozzle plates are presented positioned in separation from the means in order to illustrate their detachability. For clarifying the presentation, the air guide part 17 is presented in separation from the rest of the structure.;

25 Figure 3 presents a nozzle plate when positioned on enlarged scale in place in the supply air duct.;

30 Figure 4 presents a duct structure axonometrically and with the nozzle plate of one side being detached and with the nozzle plate of the other side being positioned in place and the parts being in separation.;

35 Figure 5 presents an embodiment of the invention which is related to a so-called open balk structure. The presentation is a cross-sectional image.;

Figure 6 presents the duct of Figure 5 in separate image axonometrically to illustrate the nozzle plate; and

Figure 7 presents a nozzle 13a₁ formed by die-cutting in the body plate in the nozzle plate.

Figure 1 presents an advantageous embodiment of the invention, in which the air supply means 10 comprises a heat exchanger 14 below the air supply duct 12 and detachable nozzle plates 13 on both sides of the centreline Y of the means. The figure illustrates a so-called closed beam structure in which the room air is circulated through the heat exchanger 14 to nozzles 13a₁, 13a₂... and onwards by an air flow provided by the nozzles downwards and onwards horizontally in the direction of the lower ceiling plane into the room off, from the adjacency of the means. As a result, the circulation air is made to flow through the heat exchanger 14 and onwards to be in connection with fresh air conducted from the nozzles 13a₁, 13a₂... The fresh supply air draws by induction principle the circulation air to flow through the heat exchanger. The combined air flow $L_1 + L_2$ is conducted downwards in the chamber B and onwards sideways off from the adjacency of the means. Thus, the combined air flow $L_1 + L_2$ is conducted advantageously to the plane of the surface of the lower ceiling and in the direction thereof, into the room. A side plate of the chamber B is marked with reference numeral 15 and the air guide part by reference numeral 17. The heat exchanger 14 with the aid of which the circulation air can be cooled or heated is located above the air guide part 17. The structure is symmetrical relative to the central axis Y. Air is conducted into a fresh air duct 12 and further, through nozzles 13a₁, 13a₂... into the chamber B. Circulation air L_2 from the room is circulated through a heat exchanger 14. The air guide part 17 comprises in the middle air permeable apertures / a surface 17b, a net or an equivalent flow passage.

Figure 2 presents detachable nozzle plates 13 installed in separation from the supply air means 10 before being fixed in place. As shown in Figure 2, the fresh air supply duct 12 comprises a planar fixing surface 12a for nozzle plates 13, on which a detachable nozzle plate 13 is fixed with fixing members R_1, R_2 such as screws, pins and push-pull parts. A sealing 16 is positioned between the detachable nozzle plate 13 and the fixing surface 12a, located around the holes $12a_1, 12a_2 \dots$ of the fixing surface 12a. At the nozzles $13a_1, 13a_2 \dots$ of the nozzle plate 13, the fixing surface 12a comprises nothing but through holes $12a_1, 12a_2 \dots$ for making the air flow therethrough and further, through the nozzle apertures of the nozzles. As shown in the figure, the nozzle plate 13 comprises edges $13b_2$ and $13b_3$, connected obliquely to a body plate $13b_1$. With the aid of the edges $13b_2, 13b_3$, a spring force is provided and consequently, sealing with the aid of the nozzle plate 13 against the stop face 12a. The fixing means, such as screws $R_1, R_2 \dots$, are carried through the holes $13c_1, 13c_2 \dots$ of the nozzle plate 13 and onto the duct part 12, to its screw holes $12c_1, 12c_2 \dots$.

Figure 3 presents a nozzle plate 13 mounted in place on the surface 12a of the supply air duct 12. The presentation is on enlarged scale. The nozzle plate 13 comprises edges $13b_2$ and $13b_3$ attached to the body plate $13b_1$. The edges $13b_2$ and $13b_3$ operate together with the body plate $13a$ so that when fixing with fixing members such as screws R_1, R_2 the nozzle plate 13 onto the fixing surface 12a of the supply air duct 12, the edges $13b_2$ and $13b_3$ are pressed first against the stop faces so that the spring force of the edges $13b_2$ and $13b_3$ can be made use of and the nozzle plate 13 can be kept tightly against the stop face 12a.

Figure 4 presents the duct construction axonometrically, the nozzle plate 13 of one side being detached and in separation from the device. The nozzle plate 13 of the other side is fixed in place.

Figure 5 presents a so-called open beam structure. The nozzle plate 13 fixed onto the fixing surface 12a of the duct 12, said duct 12 comprising, respectively as in the preceding embodiment, holes 12a₁, 12a₂..., being aligned with the nozzles 13a₁, 13a₂ ... of the nozzle plate 13. The sealing 16 circulates the elongated body plate 13b₁ of the nozzle plate 13 on the edges thereof, and enters between the nozzle plate 13 and the fixing surface 12a when the nozzle plate 13 is pressed with fixing members such as screws R₁, R₂... tightly onto the fresh air supply duct 12, onto the fixing surface 12a thereof.

The air supply means embodying the invention comprises an equivalent construction on both sides of the central axis Y. Thus, the structure is symmetrical relative to the central axis Y. Between the fresh air supply duct 12 and the side plates 15, a chamber B is defined, in the upper part whereof a heat exchanger 14 is located, wherewith circulation air L₂ can be cooled or heated. The chamber B opens upwards so that circulation air is conducted through the heat exchanger 14 e.g. from a room into the chamber B in which the circulation air conducted through the heat exchanger 14 and the fresh air conducted through a nozzle 13a₁, 13a₂... meet. According to the induction principle, the fresh air L₁ draws circulation air through the heat exchanger 14. The combined air flow L₁+L₂ is conducted sideways off from the means e.g. to the plane of the surface of a lower ceiling.

Figure 6 presents the fresh air supply duct 12 of the means of Figure 5 to illustrate the nozzle plate structures 13 as a separate image. It shows a nozzle plate 13 to be fixed with fixing parts, such as push-pull fixing means, pins or screws R₁, R₂..., comprising edges 13b₂, 13b₃ in connection with the main body plate 13b₁, being at a small angle to the plane of the body plate 13b so that when the nozzle plate 13 is fixed with fixing elements, such as screws R₁, R₂... onto the fresh air supply duct 12, the edges 13b₁, 13b₂ are pressed with the aid of screws R₁, R₂... tightly onto

the fixing surface 12a in the duct 12. In this manner, the edges can be bent with the aid of screw fixing so that the spring force therebetween and the body plate 13a can be utilized, and the nozzle plate 13 is kept tightly on the edges 13b₂, 13b₃ on the
5 fixing surface 12a. The sealing 16 is located on the edges of the body plate 13b₁ of the nozzle plate 13 between the surface 12a and the nozzle plate 13.

Figure 7 presents a nozzle 13a₁ of the nozzle plate 13 of the
10 invention, being made by die-cutting onto the body plate 13b₁. The nozzle 13a₁ comprises a cover plate part 13d, with the aid of which fresh air can be directed downwards in the chamber B. The nozzles 13b₁, 13b₂, ... can therefore be made by die-cutting or embossing in
15 one work phase so that part of the plate material will form the cover plate part 13d of the nozzle, whereby the fresh air from the nozzle aperture 13f is directed while guided by the cover plate part 13d into the chamber B in the supply air means 10.

CLAIMS:

1. An air supply means, comprising an air supply duct through which, in use, fresh air is directed, and a heat exchanger through which circulated air is
5 directed from the room, wherein the fresh air and the circulated air are combined in the air supply means, and the combined air flow is conducted into the room space, and wherein the air supply means further comprises a detachable nozzle plate in connection with
10 the air supply duct, said plate having a plurality of nozzles through which fresh air can, in use, be directed.

2. An air supply means according to claim 1, wherein the nozzle plate comprises an elongate plate-
15 like part having a plurality of nozzles which are made by die-cutting or embossing the nozzle plate such that the nozzle plate comprises holes, through which fixing members extend into the air supply duct for detachably fixing the nozzle plate onto a fixing surface of the
20 air supply duct, wherein the fixing surface comprises through holes positioned so that the nozzles of the nozzle plate will be located at the through holes of the fresh air duct.

3. An air supply means according to claim 1 or
25 2, wherein the nozzle plate is detachably connected to the air supply duct so that sealing means running along the edge of the nozzle plate will be located between the nozzle plate and the fixing surface of the supply air duct.

30 4. An air supply means according to any one of the preceding claims, wherein the nozzle plate comprises a body plate provided with nozzles and having an edge bent at an oblique angle relative to the body plate, wherein with the aid of at least one edge a
35 spring force is provided so that the edges of the nozzle plate are pressed, utilizing the spring force,

tightly against the stop faces to form a connection between the nozzle plate and the air supply duct.

5. An air supply means substantially as herein described, with reference to the accompanying drawings.



INVESTOR IN PEOPLE

Application No: GB 0108509.1
Claims searched: All

Examiner: James Hull
Date of search: 23 October 2001

Patents Act 1977 Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.S): F4V (VF AA, VF BJ, VG AB, VG BV, VG BW)

Int Cl (Ed.7): F24F (13/04, 13/06, 13/08)

Other: Online databases:- WPI, EPODOC, JAPIO

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
A	GB2349688A HALTON OY. Fig 3B shows a similar apparatus using nozzles to discharge fresh supply air.	
A	FR1347152A MARELLI. Figs 6-8 show a very similar apparatus, with metal nozzles, 6.	

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.